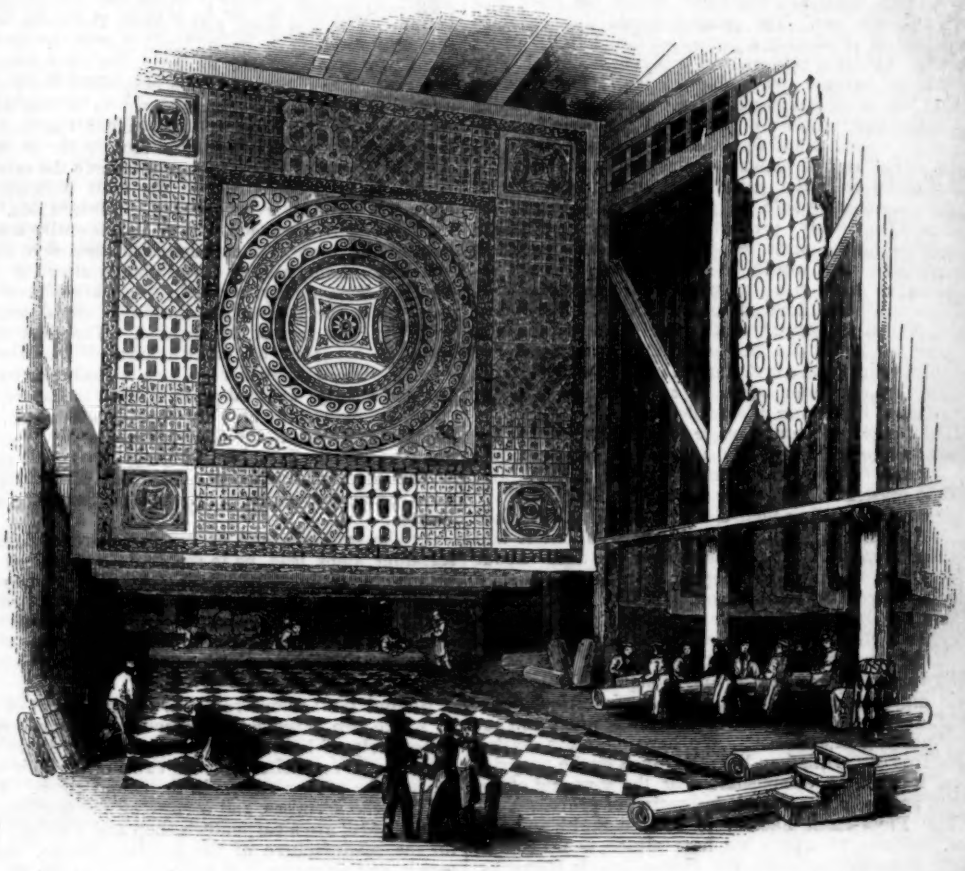
A DAY AT A FLOOR-CLOTH FACTORY.



[Drying-Room. Messrs. Smith and Baber's Factory.

WHAT would our ancestors have thought, if they could have seen the varied and glittering devices which now deck the floors of our apartments? In the times when tapestried hangings decorated the walls, the floors were either left bare or were covered with green rushes renewed from time to time as occasion required. Our old annalists and county topographers make repeated allusions to the preparations of the 'Great Hall'—a component part of most old mansions—on the occurrence of festivities, by the spreading of clean new rushes on the floor. At what period this custom was discontinued it would perhaps be difficult to say. The great beauty of the joinery-work in the floors of the majority of old mansions seems to point to the fact that they were intended to be left bare; and the polished boards, frequently arranged in a skilfully-contrived mosaic pattern, still remain to attest the care taken in their preservation. The first woven fabric used as a floor-covering in England was probably some coarse kind of drugget, for it seems at least consistent to suppose that the costly carpets imported from Turkey were not introduced until rough attempts had been made to produce a home-manufactured fabric. But be this as it may, the general use of carpets in England extended itself very slowly. It is stated in the 'Penny Cyclopædia,' that "The consumption of carpets in Great Britain up to about the middle of the last century was so very trifling, that, as a manufacture, it was hardly deserving of notice; and although now so essential to our warmth and comfort, a few generations since carpets were only partially used in the mansions of the rich. Only a few manufactories, of which that at Wilton was the most important, existed in different parts of the kingdom; and at Kidderminster, which is now the principal seat of the trade, and where at least five thousand persons are employed in its different branches, the carpet manufacture did not commence before the early part of the eighteenth century. We doubt whether at the commencement of the nineteenth century one-fourth of the present number of carpets was manufactured."

Still more recent was the introduction of that kind of floor-covering which is made of *painted canvas*, and which is generally termed *oil-cloth* or *floor-cloth*,—though *painted-cloth* would perhaps be a better name. The steps whereby we may suppose this material to have been gradually brought to the state usually presented by it at the present day are simple and obvious. In the first place a coarse hempen or flaxen fabric was woven and laid down as a floor-

covering. It was then probably suggested that the durability of the material would be greatly increased by laying on a coating of paint, or by saturating the fibres of the cloth with oil or paint, allowed to become thoroughly dried and hardened before the cloth was brought into use. The painter would then exercise his taste in producing a *pattern* on the cloth, by using paint of different colours, and applying his brush with reference to some particular device. Then would ensue the use of *stencil-plates*, as a means of producing an unlimited number of copies of the same pattern, so as to expedite and facilitate the painting of the device. The stencil-plates were probably made of thin sheet-metal with the pattern cut or stamped out of them; a pattern could be produced by painting the canvas—previously prepared with a ground-colour all over—in the parts left bare by the stencil-plates; the pattern, too, would be more or less elaborate according as there were or were not different colours, one stencil-plate devoted to each colour. Lastly ensued that improvement which arises from printing the device by blocks, the face of which are cut similar to the blocks in wood-engraving; a method which admits of very much closer accuracy and neatness than can be attained by the use of stencil-plates.

That these successive stages in the progress of the manufacture are not wholly suppositive may be shown by a kind of historical memento of the manufacture, still in existence. We have lately seen the first block ever cut for printing floor-cloth; it is still in the hands of the family of the manufacturer who cut it and printed from it, and remains to show the time—about ninety years—which has elapsed since the use of such blocks originally commenced. Before that time the floor-cloth manufactured, very limited in extent, as may be well supposed, received whatever pattern was intended for it by the use of stencil-plates.

Simple as may appear at first thought to be the mere painting of a piece of cloth, the manufacture of floor-cloth involves many curious processes, which are not ill-deserving of attention. We have therefore availed ourselves of permission, liberally given by the proprietors, to visit an establishment at the west-end of the town, and to follow the whole routine of processes.

The Floor-cloth Factory of Messrs. Smith and Baber, the one to which we here allude, is situated at Knightsbridge, opposite the Horse-Guards Barracks. Many of our readers, in walking across Hyde Park from the end of Oxford-street to Knightsbridge, and just before reaching the eastern end of the Serpentine, may have probably seen a high square building standing up prominently in the background, much more lofty than any surrounding building, and occasionally coming into sight between the trees. This is the factory in question, or rather it is a kind of square tower surmounting the factory; and on approaching nearer to it we see that the building itself is one of considerable extent. All floor-cloth factories are required to be both lofty and extensive in area; because, as we shall see farther on, very large pieces of canvas have to be extended at different times both vertically and horizontally.

The northern extremity of the building presents to view a rotunda, or circular apartment, forming the principal entrance to the factory. From thence the various parts of the building extend to a distance of about two hundred and fifty feet towards the south, presenting an eastern façade more decorative than is often seen in factories of the kind. On proceeding within the entrance rotunda, we come to a kind of show-room, lined on either side with specimens of the finished manufacture, mostly in the form of rolls. At the southern end of this room are two offices or counting-houses, with an entrance between them to the largest room in the factory, the one indeed which entails a necessity for considerable area and elevation. This is the 'drying-room,' represented in our frontispiece; it is about one hundred and twenty feet in length, by sixty or seventy in width, and of considerable height. The first thing which meets the eye on entering this room is a magnificent specimen of floor-cloth, remarkable alike for its large dimensions and intricate mosaic pattern; it is suspended from a considerable height, and hangs down to within six or eight feet of the floor. A still larger specimen has been recently produced at this factory for Mehemet Ali, the Pasha of Egypt; but we believe the one here deposited is deemed one of the most difficult and elaborate patterns ever produced in floor-cloth. Behind this large specimen, and along the entire western half of the room, are suspended finished floor-cloths, which are hung here to dry gradually after the painting has been finally effected; these are placed over poles near the roof of the building, and descend to within a few feet of the ground. The floor of the room is occupied by chalk-marks delineating the size or pattern of required pieces of cloth; or by men cutting a large finished piece of cloth to the required size; or by others opening a bale of canvas, and spreading it out on the floor preparatory to placing it on a roller; or by others hauling up a roll of canvas to the painting-room:—one or more of these operations being carried on at a time according to circumstances.

At the southern end of the drying-room a few descending steps lead us to the 'colour-room,' wherein all the colours used for painting the cloth are prepared. In the centre of this room is a large horizontal cog-wheel, moved by horse-power; and around it are various machines set in motion by cog-wheels acting in the larger wheel, and employed in the grinding and preparation of the colours.

Behind the 'colour-room' is an open court or yard, in which are three large linseed-oil cisterns, capable collectively of holding forty tuns of oil. From these proceed the requisite pipes for causing the flow of the oil into the proper vessels in the colour-room. In the rear of the premises, and occupying the southern side of the yard, are a carpenter's shop and a smith's shop, for the manufacture of the printing-blocks, and the repair and adjustment of various parts of the working apparatus.

Returning again to the large drying-room, and ascending a few steps, we come to a range of store-rooms over the colour-room. One of these is the canvas-room, where the canvas, brought from Scotland in bales, and afterwards rolled up into coils, is deposited till required for use; these coils, about five or six feet high, are ranged vertically on all sides of the room. Another is the 'print-room,' or store-room, where are kept the greater part of the carved blocks used in producing the patterns on floor-cloth: these, as will be easily conceived when we come to describe the process, are necessarily very numerous; in fact, they amount to some thousands, and all are preserved with great care, since the fracture of any of the small projecting points would at once spoil the pattern. The room in which they are kept maintains a pretty constant temperature throughout the year; and the wood of which the blocks are formed thus avoids the injury which might result from change of temperature and moisture. In this range, too, is a colour store-room, and others which require no particular notice.

A farther ascent of a few stairs brings us to the 'frame-room,' a part of the premises so closely filled, that it is difficult at first for a stranger to see what is going forward. He soon observes, however, that the room, which is long, wide and high, is occupied

by a series of vertical frames, with canvas stretched over them, and a sufficient interval between them to allow a man to pass. Let the reader conceive a stretched canvas, about sixty feet long and twenty-four high, enclosed in a frame similar to a schoolboy's slate; and twenty or thirty of these lying parallel, with a slender scaffolding built up in each of the intervals between them; he will then have an idea of the appearance of the 'frame-room.' The greater part of these frames are about the size here mentioned; but there are others extending as much as ninety-eight feet in length, although the height is somewhat less than that of the shorter frames. Nearly on a level with this room is a floor or platform by which access is gained to the long pieces of passage floor-cloth, suspended, like the others, from near the roof of the building.

The next stage or story of the factory is the 'printing-room,' where the floor-cloth receives the pattern by which it is distinguished. Here we see square cushions—something like the inking-cushions used in hand-printing—covered with bright colours, and men transferring the colours therefrom by means of blocks to the painted canvas, the latter being stretched out on a long flat bench. Another room above this is similarly occupied by men 'printing' the narrow floor-cloths for passages.

On the summit of the building, at a considerable elevation, is a small square room, provided with windows on all four sides. From this an extensive view may be obtained in every direction, since the position of the observer is considerably higher than any other building in the neighbourhood, except church towers. As this room is, however, rather an apartment than a portion of the factory, we shall not farther allude to it.

The tour of inspection we have just taken will have probably informed the reader that the routine of processes carried on in the manufacture is somewhat as follows:—opening the bales of canvas, coiling the canvas on rollers, hauling the rollers up to the frame-room, stretching the canvas on the frames, painting the canvas while in this position, removing the painted canvas to the 'printing-room,' painting or printing the device on it, and finally suspending it in the drying-room till ready to be employed as floor-covering. To these successive steps, then, we shall direct our attention.

If we look at the edge of a piece of floor-cloth which has been rent or worn into holes, we shall see that its foundation is a woven fabric of a coarse but stout quality. Some of the finer and superior floor-cloths are coated so completely on both sides with paint, and brought to such an excellent surface, that they assume much more the appearance of leather than of cloth; but still it is easy to satisfy ourselves of the foundation being woven vegetable fibre. Sometimes, when an old carpet of good quality has lost its beauty of appearance without falling to pieces, it is converted into floor-cloth, by having the *back* of the carpet painted and printed so as to form the *face* of the floor-cloth. But this is an exception to a general rule, and we may confine ourselves to the notice of new canvas woven expressly for the floor-cloth manufacture.

We believe that there is one, and only one, establishment in London where the canvas is woven by the floor-cloth manufacturer. The general rule is to have the canvas woven in Scotland, by parties who either confine themselves wholly to this line of business, or at least give it a marked degree of attention. That this is a business very distinct from that of ordinary weaving may be conceived from the fact that the ordinary widths are eighteen, twenty-one, and twenty-four feet. The canvas is brought partly from Kirkaldy, but principally from Dundee, a town celebrated more than any other in Britain for the extent of its manufacture of coarse sheetings, sackings, sail-cloth, and similar woven fabrics of flax and hemp. The looms for the weaving of floor-canvas are made expressly for that purpose, since all the modern floor-cloths are made without a seam. As the weft or width of the cloth extends to six or eight yards, of course the shuttle has to be driven this distance at each successive traverse of the weft-thread. At first sight these cloths have more the appearance of hemp than of flax, but hemp is used only to a limited extent, because it is found not to receive and retain the colour so well as flax; the latter is therefore the material generally employed. The canvas has a fineness of about sixteen or eighteen threads to the inch, and a degree of stoutness which may be expressed by saying that a square yard weighs about twenty-one ounces.

The canvas, after being shipped from Dundee by steam, arrives at the London factory in the form of compact bales, about three feet in length, and between two and three in width and depth. Each bale contains canvas of one particular width, the lengths and widths being regulated thus:—one kind measures a hundred yards in length by six in width, another a hundred and eight yards in length by seven in width, and another a hundred and thirteen yards by eight. The bales usually weigh about five hundredweight each. The first operation after they are brought to the factory is to open them, and cut them to such lengths as suit the dimensions of the frames, which, as we have before stated, are between sixty and a hundred feet in length. The canvas is rolled up and deposited in the canvas store-room till wanted.

When a piece of canvas is about to be painted, it might be supposed by one whose thoughts were then first directed to the matter, that it might be laid flat on the ground, pulled and perhaps nailed at the edges to stretch it smooth, then painted, and, when dry, painted on the other side. It will be seen, however, that a very different plan is adopted in practice. A party of men unroll the canvas, and lay it down pretty evenly on the floor of the drying-room. They then take a wooden roller, rather longer than the width of the canvas, and about five inches in diameter, and lay it down on one end of the canvas. On this roller the whole of the canvas is coiled, and in that state can be easily carried from place to place. The roller, with the canvas wound on it, is then erected on one end and hauled up into the frame-room by means of a pulley. Here an iron point or gudgeon is dropped into a hole in a moveable carriage, and the roller is moved to its place in a very simple but ingenious manner. Two or more men hold the upper end of the roller; while others, standing on the floor of the room twenty or twenty-four feet lower than the others, guide the carriage in which the lower end of the roller rests. The roller is thus brought to its proper position coincident with one end of the frame to which the canvas is to be attached. This frame, like all the others, is formed of stout oaken beams, two horizontal, to form the top and bottom, and two vertical, to form the sides or ends. The roller being about the same height as the frame, and a small portion of the canvas being unrolled, it is easy to nail the edge of the canvas to one of the upright posts, thus forming the first part of the stretching of the canvas. The wheel-carriage on which the roller rests is then wheeled onward, the canvas unrolling as it proceeds, parallel with the frame. As it unrolls the canvas is fastened temporarily to the top beam by means of a simple but ingenious contrivance called a 'quickset'—a much more intelligible name than is often applied to working tools. This quickset is a kind of a screw and nut, provided with a large hook at the top, and a small pointed hook at the bottom: the large hook catches hold of a rod lying on the top of the frame,

while the small lower hook catches in the canvas: there is a nut by which the screw is carried up tightly to the upper beam of the frame, so as to keep the canvas nearly at its proper height; while the upper hook, by being able to move along the rod, suffers the quick-set to move to the right or left as the canvas becomes stretched. This is only a temporary contrivance, used while the immense area of canvas is being adjusted to the four sides of the frame; but it is one of those ingenious adaptations which could only result from a steady observance of the object in view.

When the low-wheeled carriage, in which the roller rests, has travelled from end to end of the frame, and the canvas has become wholly unrolled, and the upper edge temporarily held up by a number of 'quicksets,' the roller is wholly removed, and the second or remaining upright edge of the canvas is nailed to the other upright beam of the frame. It will readily be understood that, if this beam were a fixture, it would be next to impossible to nail the canvas to it with sufficient tightness and stretch in every part. The beam is loose, and the edge of the canvas is nailed to it while the canvas itself is very loose. Two screws are then brought into use, one attached to the upper end and the other to the lower end of the beam; and each screw being worked, the post is drawn forward until the canvas is fully stretched; after which the beam is fixed, and the canvas remains stretched. When it is considered that each of these pieces of canvas contains from fourteen to eighteen hundred square feet, and that it is drawn out nearly as tight as a drum before operations are commenced upon it, it will be readily supposed that a powerful force is required to effect the requisite strain. When the two vertical edges are properly secured, the upper and lower horizontal edges are fastened. The upper edge is nailed, at distances of between two and three inches; and the 'quicksets' are removed when their aid is no longer required. The fastening of the lower horizontal edge requires a force analogous in kind (though not so great in amount) as that applied to the vertical edge. The edge is nailed to the lower beam, and the beam is forced down by means of levers, chains, and hooks, until the canvas is stretched as tightly in the vertical as in the horizontal direction; and in this position it remains for several weeks, while the greater part of the processes are being wrought.

This stretching or 'framing,' then, it will be seen, is a much more important part of the operations than a first thought would lead us to suppose. The canvas is to be painted on both sides; and the mode of framing just described enables each surface to be brought equally into a vertical position. The distance between the frames is probably about thirty inches; and in this narrow space is built up a scaffolding so slender that one almost wonders how it can maintain stability. It is a scaffolding of four tiers in height, to enable the workmen to reach every part of a surface twenty-four feet high. It is necessarily detached from the canvas on either side, and consists in fact merely of a nine-inch board, supported at intervals of every few feet by vertical posts. Access to the upper tiers is gained either by ladders quite upright, or by ledges placed on the upright beams at the end of the scaffolding—a contrivance intended to save as much room as possible between the frames.

If we take up a piece of floor-cloth we shall see that the back is painted as well as the face, although no pattern is imprinted upon it: this is done to increase the durability, the cleanliness, and the appearance of the canvas; but the quantity of paint laid on the back is of course much less than that applied to the face of the cloth. The first operation is to level the surface of the canvas, and to prepare it for the reception of the paint. This is done to the back first, and in the following manner. A weak solution of *size* is prepared, and laid on the canvas with a brush; and while thus wet the canvas is rubbed well with a flat piece of pumice-stone, to level the slight irregularities which occur in the fibrous material. The liquid size not only facilitates this process, but by its gelatinous quality prevents the oil of the subsequently applied paint from penetrating too far into the substance. It is found that the size makes a good foundation or hold for the paint; but it is also found that if the oil penetrates through the canvas, the floor-cloth will become brittle, and not sufficiently pliable; and to prevent this is one of the objects of the size-priming. The pumice-stone—a lava from Vesuvius or Etna—is cut by hatchets into brick-shaped pieces about six inches in length by two in thickness. The workmen rub to and fro with these pieces of pumice over the wet canvas, until the surface is rendered considerably smoother than in its natural state. They mount the highest stage of the scaffold, and rub down the upper portion of the canvas first: then they descend to the next stage, proceeding from end to end of the piece of canvas sixty or a hundred feet in length; and so on to the lower stages.

While the sized canvas is drying, we will visit the colour-room, and briefly consider the nature of the paint applied to the canvas. The painting of floor-cloth is, in principle, analogous to house-painting, though different in some of the practical details. The materials employed are the usual dry, earthy, and crystalline colours; such as white-lead, the ochres, the chromes, verditer, Prussian blue, vermillion, &c. These are mostly brought to the factory in tubs or small casks, and are prepared for use in the colour-room. The large earthy colours are ground to powder by means of a crushing-roller four feet in diameter by about twelve inches thick: this is worked by a horse; and as the shaft belonging to the roller has at the top a large horizontal cog-wheel by which other machines are worked, the whole, or any part of them, are set in operation at one time. When the pigment has been brought to the proper state of fineness by this or any other means, it is put into a tall open vessel called a 'mixing-tub,' in which a stirrer is kept rotating by a shaft placed in connection with the large cog-wheel. Linseed-oil, flowing through pipes from the cisterns behind, is introduced into the mixing-tub; and the stirrer works the ingredients well up together until completely amalgamated. But this mixing would not be sufficient to bring the paint into a proper state for use, since the dry ingredient, although fine, was by no means an impalpable powder. The paint is therefore allowed to flow from the mixing-tub into a vessel beneath; and is thence laded into the hopper or orifice of a pair of millstones precisely analogous to those by which corn is ground. There are two mixing-vessels, and two pairs of millstones; all four machines being worked by the large cog-wheel. As the paint flows down into the shallow vacant space between the millstones, it becomes ground by the rotation of the upper stone, or 'runner,' and when perfectly smooth and homogeneous, is allowed to ooze out from between the 'runner' and the 'bed-stone' into a vessel beneath. The runner is loaded or not according to the fineness of the paint to be produced. From the vessels into which the paint flows it is conveyed into store-tubs, where it is kept until wanted for use: it is then drawn off into the paint-pans or pots, from which it is used. For some of the finer kinds of colours, or where the quantity required is not such as to render the use of the millstones necessary, a flat stone and hand-muller are employed in the grinding of the paint, such as are commonly used by house-painters; but the principle is just the same.

The paint employed for floor-cloth has these two peculiarities, when compared with that used in house-painting;—it is very much stiffer or thicker, and has scarcely any turpentine in its composition. Both of these characters are given to it to ensure the durability of the cloth; since a large body of paint can be laid on when the consistency is thick, and the paint becomes harder and more durable when the liquid employed is wholly or almost wholly oil,—although a much longer time elapses before the paint becomes thoroughly dried and fit for use.

When the paint is prepared, with a thickness or consistence not much less than that of treacle, it is applied to the cloth in a very curious manner, more analogous to the manipulations of a plasterer than those of a painter. The workman holds in his left hand a stout thick brush, which he dips into the paint-pot, and then dabs or splashes on the canvas; the paint is too thick to be brushed over in the usual way, and is therefore laid on abundantly in a few detached patches. The workman holds in his right hand a kind of trowel, consisting of a long narrow blade, about a foot in length, decreasing in width towards one end, and having at the other a handle which bends back over the blade. With this trowel, as represented in the annexed cut,

[Trowel-painting.]

the workman draws the paint over the canvas, smoothing it repeatedly, and drawing a supply from the patches or masses of paint which had been thrown on by the brush. The trowel is worked with its plane or face not precisely parallel with the surface of the canvas, but somewhat inclined, so as to rub or scrape the paint into the fibres of the canvas. The scaffolding, being erected somewhat on the principle of that used by builders, has its successive stages so far distant as to allow the arm of the workman to reach over the intervals between them; so that by descending from one stage to another, and working on the portions of canvas intervening between them, the whole piece can be prepared in a similar way. The edge of the plank or platform forming each stage of the scaffolding is about a foot or fifteen inches distant from the canvas, so that the workman is enabled conveniently to reach it.

The process here described relates to the *back* of the canvas—that surface which is to be underneath or next to the floor when the finished floor-cloth is in use. After this 'trowel-colour' is, however, laid on the back of the canvas, and when it is nearly dry, operations commence on the face, which has hitherto been left untouched. The surface is wetted with a weak solution of size, and rubbed down with flat pieces of pumice-stone, as in the former case, and with the same view of preparing the fibres of the canvas for the reception of the paint. When this is done, the face is not further proceeded with until the back is finished.

The thickness of the colour laid on, and the absence of turpentine or 'driers' in the paint renders the drying a slow process, from ten days to a fortnight being required for the drying of the 'trowel-colour,'—when this is, however, effected, a second coating of paint is laid on, having the same colour as the former, but differing from it in two respects: it is much more liquid, on account of the addition of an extra portion of oil, although considerably thicker than common house-paint; and it is laid on wholly with a brush, instead of being worked conjointly with a brush and a trowel. Hence it is called the 'brush-colour,' to distinguish it from the first or 'trowel-colour.' The tint is of no particular importance; but we believe that each manufacturing firm is accustomed to adopt one particular colour for the back of their floor-cloth, which thus becomes a kind of symbol; besides which, certain private marks are stamped on the back of the cloth; after which that surface is finished. The time has been when a duty was laid on floor-cloth, and when the Excise officer exercised that supervision which is so vexatious and mischievous in manufactures; but this is no longer the case.

The back of the canvas is entirely finished before the face has undergone any process except the sizing and rubbing down with pumice-stone; but now the preparation of this surface is attended to. A 'trowel-colour,' similar in consistence to that used on the back, is applied, and allowed to remain untouched till dry. Then the face is pumiced a second time, to work down some of the asperities and projections which still remain on the surface. To this succeeds a second trowel-colour, in every respect resembling the first; and after a due interval for drying, the surface is a third time rubbed down with pumice. Again is the routine repeated, by applying a third trowel-colour, and following it up with a fourth rubbing down with a pumice, after which is given a 'brush-colour:' the object of this careful and long-continued series of operations, which occupies a period of two or three months, is to bring the surface of the canvas to a state of great smoothness and pliability. The repeated rubbing with pumice-stone not only levels irregularities, but imparts to the canvas much of the pliability and durability of leather. We believe that where floor-cloths are made expressly to be sold at a low price, the routine of processes is more expeditious and less complete than that here indicated; but we are describing the operations of an establishment where none but the better kinds are manufactured, as a means of giving a more close insight into the matter.

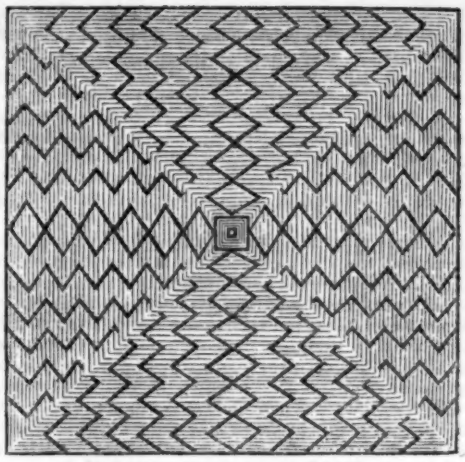
We now approach that class of operations which, so far as appearance is concerned, is the most important of any, and the most interesting to a stranger who visits a factory of this kind: we mean the *printing*, or transfer of a device to the surface of the cloth. It must be borne in mind that the canvas is all this time in a vertical position, stretched over the frame to which it had been fixed two or three months before; and that the colour of the final coating of paint is that which is to form the ground or foundation colour of the pattern. The printing is effected while the canvas is lying horizontally on a long bench or table; and an entire removal is therefore necessary. The painted canvas is gradually loosened from the nails by which it is fastened to the frame, and is transferred to a roller whose length nearly corresponds with the width of the canvas. The canvas in its original state weighs not much less than two hundred pounds; and the vast

body of paint subsequently applied to it increases the weight very considerably; so that the loosening of the canvas from the frame, the transference to a roller, and the hauling up of the roller with its load to the printing-room up stairs, are arrangements requiring some tact and judgment. When the roller is carried up, it is placed horizontally at a few inches from the floor, in front of a very long work-bench; and two gudgeons or projecting axles at the ends of the roller being placed in sockets, the canvas can be uncovered from the roller by the rotation of the latter, and spread out upon the bench to be printed.

Here it will be desirable to offer a few brief explanations respecting the patterns of floor-cloths and the modes of producing them. We have before alluded to the original block first cut for the floor-cloth manufacture. This is now in the possession of the firm whose establishment we are describing, an establishment which was the first in England in this line of business. Before the year 1754 Mr. Nathan Smith, the founder of the firm of Messrs. Smith and Baber, was accustomed to manufacture floor-cloth in pieces of two or three yards square, in the only method known at that time. Holes were cut in some determinate pattern in thin plates of metal or pasteboard; and these plates being laid on the canvas, and paint applied with a brush, the paint could only reach the canvas at those parts which were not covered by the plate: this is the method of 'stencil-painting,' which is occasionally applied to painting the walls of rooms in distemper, and for other purposes. Each small square of floor-cloth had a border given to it all round; and if a large room were to be covered, several such pieces had to be used. To what extent the floor-cloth manufacture was carried on at that time we have no means of knowing; but it must have been very limited indeed.

A necessary result of stencil-painting is, that very little *substance* of paint is laid on the canvas, since the application of a brush levels the paint to a mere film; and Mr. Smith sought for some means of obviating the defect. He conceived that if a thick wooden block were prepared, the surface levelled and smoothed, a pattern sketched upon it, and this pattern cut out by means of carving tools, the device might be transferred by a process analogous to that of printing. Most readers are at the present day aware that the blocks used for wood-cuts, such as those which illustrate the present article, are cut so as to leave the pattern untouched; that is, the parts of the block cut are only such as give the *white* lines or portions of the devices; whereas the *black* lines, which usually constitute the picture, are produced from the surface of the block left uncut. The block being pressed down on an elastic surface covered with ink, or ink being applied by means of soft elastic balls, or by means of cylindrical rollers, the surface only of the device receives a coating of ink, leaving the interstices free; and upon this being transferred to paper, the black lines of the wood-engraving result.

On this principle did Mr. Smith conceive that the paint might be applied to floor-cloth, the paint in this case being a representative of the ink in the former. He cut with his own hands a device on a square block of wood measuring about twelve or fifteen inches each way, a device which is represented in the annexed cut taken from the block itself. The pattern, it will be seen, is not a very elaborate one; but still it was one calculated to test the practicability of the plan which had suggested itself to his mind. An impression from this block was exhibited by Professor Brande, in an illustrated lecture on the floor-cloth manufacture at the Royal Institution, about five or six years ago; and the block itself is carefully preserved by the descendants of Mr. Smith, as an historical memento of an important step in the progress of the manufacture.

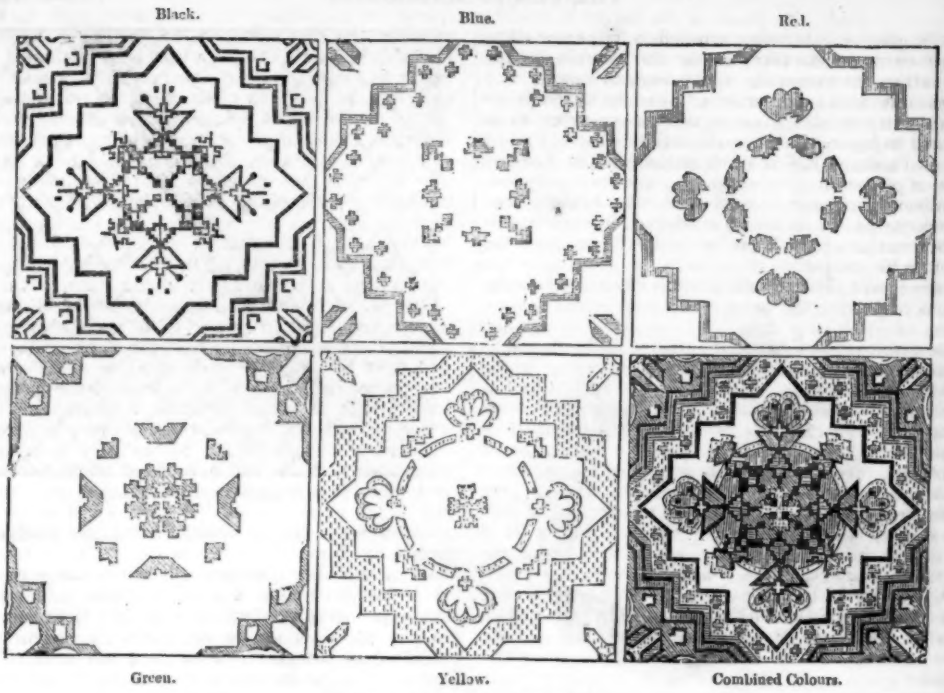


[The original Floor-cloth printing-block.]

Mr. Smith, like inventors generally, was very careful of his production, and for a considerable period printed all his floor-cloths with his own hand, allowing none of the workmen to see the block, and adopting singular precautions to damp the curiosity of visitors. The original manufactory occupied the site of the present building, and remained standing for forty years, when it was burnt down in 1795. The present structure has been standing not quite twenty years.

The method of printing, originally planned, was very much more simple than that now adopted, owing to a circumstance which it is important that we should clearly explain. If, instead of printing in *one* colour, we adopt *several*, the complexity is greatly increased; for it would be impossible to paint one part of the block with one colour, and one with another, and then transfer the device to the canvas. It is necessary to have as many blocks as there are colours; and the great difficulty consists in adjusting these blocks so as to unite in producing one pattern. The principle is analogous to that of 'colour-printing,' introduced within a few years, wherein, instead of printing with black or blue or any other monochromatic ink, we have several colours combining to produce one pattern. In such a case a series of plates is prepared, either by cutting away those parts which are not to form the pattern, or inserting slips of copper to form the pattern; each plate being made to furnish one particular portion of the device, viz., that of one particular colour. So it is with floor-cloth printing, under a different modification to suit the object in view.

A moment's consideration will show that the carving of the blocks must be a point of great nicety; for if a portion of the device, cut on one block, occurs at the same point as a portion on another block, the two colours will be confounded together, and the device lost. All the blocks are precisely the same size (about fifteen inches square), all are rectangular, and all are applied successively to every part of the floor-cloth, in patches corresponding with the size of the blocks. Each block is cut away at those parts which are left prominent in all the other blocks; so that it will not impart colour to the cloth where the latter would be coloured by any of the remaining blocks. Perhaps we cannot better illustrate this than by taking an actual specimen of floor-cloth, printed in five colours, and showing the precise device cut upon each of the five blocks, as far as we can do so on a small scale. In our group of



[Blocks to produce one Pattern.]

patterns we have represented colours heraldically, the only way of so doing when black ink only is used; by heraldically we mean the adoption of certain modes of engraving used in printed plates relating to heraldry, such as the following:—white is represented by a white space, black by a black space, yellow by dots, green by oblique parallel lines, red by vertical lines, blue by horizontal lines, &c. One of the six figures represents the finished pattern, built up as it were of five separate portions; and the others show how the blocks are separately fitted to join in producing the design. Of these five, one is yellow, and the dotted portion shows the parts which are left prominent in the block, all the rest being cut away. In another we see, by the arrangement of oblique lines, the pattern intended to be given in a green colour. The red and the blue are in like manner represented by their peculiar lines; and the black portion of the pattern is given in the form which engravers call 'solid.' It will be seen that the device differs greatly in the several blocks; so much so that they could hardly be recognised as uniting to form one pattern, unless that pattern were presented at the same time. In some rare cases as many as ten or twelve colours have been used in one floor-cloth; and this entails—not only the cutting of an equal number of blocks—but a greatly increased amount of care in every part of the operations.

The choice of patterns for floor-cloth is of course, like that of calico-printing, a matter of taste. Each manufacturer exercises his ingenuity, or avails himself of the ingenuity of others, in devising new patterns. Sometimes, when a piece of ancient tessellated pavement is discovered, such as has recently occurred in the City, the mosaic pattern is immediately copied, and introduced, either as a whole or in part, as a pattern for floor-cloth. But from whatever source the pattern is derived, the mode of transferring it to the several blocks is nearly as follows. The pattern is first drawn and painted in a complete and careful manner, on a sheet of stiff paper exactly the size of the blocks, every colour and every portion of the device being given precisely as it is to appear in the finished floor-cloth. Another piece of paper is then taken, and laid under the first, and by means of a pin or pricker one portion of the device is transferred in outline to the lower paper. Thus: suppose we commence with green; the workman follows the outline of the green portion of the device, pricking through both papers with a pin, and thus having a series of pin-holes very close together. The under paper is removed, and another one placed in its stead, which we will suppose is to receive the red portion of the device. The workman transfers the outline of this red portion, by means of pin-holes penetrating through both papers to the lower one; and this is in its turn removed to make way for a third. Thus the operation continues, until as many pricked papers are prepared as there are colours; and it must be obvious from the nature of the method that these outlines are transferred precisely in the way in which they occur in the model pattern. This pattern thus becomes almost one mass of perforation, but it has answered the purpose for which it was intended.

The blocks on which these devices are next to be transferred are made with especial reference to the avoidance of warping or twisting. They are formed of two thicknesses of white deal and one of pear-tree wood, ranged so that the grain of the one shall cross that of the adjoining one, and thus counteract any tendency to distortion. The several layers, after being glued, are kept for some time in a powerful screw-press, as a means of ensuring as close a joint as possible; and when the whole mass, about two inches and a half in thickness, is dried and planed smooth, the pear-tree surface is ready to receive the device. The pricked paper is laid upon the surface, and a little pounce or pounded charcoal, held in a bag which is dabbed on the paper, penetrates the pin-holes, and leaves a series of slight marks on the block sufficiently

distinct to guide the pencil of the carver in working out the pattern. He then proceeds to cut away all the parts which do not form the device, carefully leaving the latter. Occasionally, if the pattern admits of it, small brass pins are inserted to make up the form, and brass pins are also fixed at the corners to guide the printer in joining the several portions which he prints, and in making the coloured portions to fall in their proper places.

When the cutting of the set of blocks for one pattern is completed, the blocks are soaked with oil on their upper surface, to fit them better for the purpose they are to fulfil; and when all is ready, the printing-process commences. The printing-room contains a great

[Cushions.]

number of flat cushions similar to those represented in the annexed cut. Each cushion measures about three feet by two and a half, and consists of a pad of flannel covered with a piece of floor-cloth. There are, for every pattern, as many of these cushions required as there are colours in the pattern about to be printed. A pot of paint, not so thick as that before spoken of, but still having a considerable degree of consistence, is placed beside each cushion, and a man with a brush lays a plentiful coating of paint on each; or at least there are one or more boys and men so engaged as to keep all the cushions supplied with sufficient rapidity.

The printer then takes one of the blocks, which he holds by a kind of leathern loop passing over the left hand, and dabs it down on the wet cushion, whereby a tolerably thick layer of paint is caught up by all the projecting parts of the block. He proceeds to the long bench on which a portion of the prepared canvas is

[Man in the act of printing.]

spread out, and stamps the block down upon the cloth, whereby the first germ of the pattern is imparted. He holds in his right hand a very heavy hammer, with which he forces the block down into close contact with the cloth, as a means of ensuring the transfer of the paint. A second impression is then effected with the same block close to the first, care being taken that the two impressions shall form one continuous pattern. The printing thus proceeds until the whole width of the piece corresponding with the length of the bench is printed, as far as one width of this block can do it. Then ensues the application of the second block, used with paint of a different colour; the block being pressed successively over every part of the cloth, as the first had been. In this second printing a twofold accuracy is required; first in respect to the successive applications of the same block across the width of the cloth; and next in reference to the junction of the colour in the proper relation to the colour of the preceding block; both of which are attained by attention to the guide-points fixed in the corners of every block.

When the whole of the blocks have been used in succession, and the entire printing effected across the cloth, and to a length of fifteen inches, the roller on which the cloth is wound is turned a little, by which the printed portion is allowed to fall down behind the bench, and a new portion to occupy the horizontal surface of the bench, after which the printing proceeds as before. There is a long aperture in the floor of the printing-room, through which the cloth is allowed to descend as it is printed, and to hang down freely exposed to the air: new portions are unrolled from time to time, as the printing advances, and the finished portions fall lower and lower.

If we examine a piece of floor-cloth, we shall see that there is nowhere a large smooth patch of paint, except in large plain patterns; but that the paint is laid on in little nodules or spots, technically called 'teeth,' from an eighth to a quarter of an inch square. The object of this plan is the following:—If a flat surface of wood, say two or three inches over, were dabbed down on a cushion covered with thick paint, the paint would be taken up very unequally, on account of a kind of adhesion between it and the block and cushion: it would be congregated more plentifully near the centre than near the edges, and would look patchy and unequal when thus laid on the cloth. Instead of this plan, therefore, the surface of the wood is broken up into a number of smaller surfaces by means of little channels which act as air-holes, and which enable the paint to be taken up equably. We see that each of these little spots or 'teeth' has the paint very thick in its centre; this contributes to the durability of the cloth; but if a similar thing were to occur with a surface an inch or two square, the effect would be very unsightly.

In printing passage floor-cloths of narrow but determinate breadths, the canvas is cut into strips after being prepared on the frames, and is then printed in the same manner as the other, with the exception that the border is printed by narrow blocks much smaller than the square ones. All the floor-cloths of either kind are allowed to hang suspended in the air in the drying-room until fit for use; when they are lowered, spread out on the floor, and cut or planned according to the purpose to which they are to be applied.

In concluding our brief notice of this interesting branch of manufacture, we may remark that floor-cloth is capable of being prepared in such a way as to form a very durable material for covering the roofs of houses. We have seen some which has been so employed for nearly twenty years, and is still in good condition.